REMARKS

Claims 1, 3 - 8, and 10 - 18 are pending in the case. Claims 2 and 9 were canceled without prejudice. New claims 17 and 18 were added. Claim 1 was amended to advance the allowance of the subject application. The disclosure was amended to remove typographical errors. Reconsideration of the subject patent application is respectfully requested in view of the above amendments and the following remarks.

The disclosure was objected to because of the informalities indicated on page 2 of the Office action. Applicant thanks the Examiner for pointing out the typographical errors in the specification, which have been corrected. With respect to the abbreviation "TGA," applicant respectfully submits that "TGA" stands for "thermogravimetric analysis," as is disclosed on page 31, line 4 of the specification. The abbreviation "^{31}PNMR" stands for the term "phosphorus-31 nuclear magnetic resonance." The disclosure was amended to include such term. In view of the above, applicant respectfully submits that the subject objection is believed to be overcome.

Claims 1, 2, 5, 8 and 12-16 were rejected under 35 U.S.C. § 102(b) as being unpatentable over Otsuka Chemical Company EP 0 945 478 for the reasons set forth on page 2 of the Office action. In response, applicant amended claim 1 to recite the features in the original claim 9. Therefore, the above rejection is believed to be moot.

Claims 1 - 16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over EP0945478 (Reference 1), in view of JP2002-146146 (Reference 2), JP2000-198793 (Reference 3), JP2001-98144 (Reference 4) or JP4-198189 (Reference 5) for the reasons set forth on pages 3 and 4 of the Office action.

Applicant respectfully disagrees that claim 1 is unpatentable over Reference 1 in view of one of References 2 to 5 based on the results of the International Search Report (the "ISR"). The Office action indicated that Reference 1 alone does not disclose the original claim 9. Applicant respectfully submits that nor does the ISR shows that

any one of References 2 to 5 discloses the features in the original claim 9. Therefore, even if Reference 1 is combined with References 2 to 5, such combination does not disclose claim 1 as amended. Accordingly, applicant respectfully submits that the subject rejection is believed to be moot.

For the Examiner's convenient reference, applicant respectfully submits the following summaries of References 2, 3 and 5:

(1) Reference 2 (JP2002-146146)

Reference 2 discloses a flame retardant thermoplastic resin composition having a moisture content of 0.5 wt % or less. Such a moisture content reflects that in the resin composition comprising the phosphazene composition.

(2) Reference 3 (JP2000-198793)

Reference 3 discloses a method of making a phosphazene composition which is similar to that of Comparative Example 1 in the present specification. In other words, the method in Reference 3 is contemplated to provide a high purity phosphazene composition without side reactions, such as hydrolysis, crosslinking and the like. Reference 3 also suggests, in Examples and Comparative Examples, that a phosphazene composition having a content of volatile components in a smaller amount is preferred.

Furthermore, Reference 3 discloses that the content of volatile components is measured in accordance with the industrial standard of JIS-K2246, in which a content of volatile components is measured after heating a sample in a boiling-water bath for 2 hours. Accordingly, the content of volatile components in Reference 3 is measured at the temperature of 100 °C.

(3) Reference 5 (JP4-198189)

Figure 1 of Reference 5 represents weight-reducing rates measured by TGA ranging to 350 °C in connection with a phenoxyphosphazene composition (*i.e.*, a mixture of phenoxyphosphazene compounds) of Example 1 and a phosphazene compound having only an aliphatic group as a side chain of Comparative Example 2.

The curve of the former composition is named "A" and the curve of the latter compound is named "B" in Figure 1, respectively.

Figure 1 also shows that the temperature at which the weight of the phenoxyphosphazene composition begins to reduce is relatively low, e.g., 175-180 °C. On the other hand, in Figure 1 of Reference 5, the weight retention of the phosphazene compound having only an aliphatic group as a side chain at 300 °C or more is less than 10 wt % (*i.e.*, the weight-reducing rate is more than 90 wt %).

Reference 5 does not disclose that when a weight retention of a phosphazene composition according to TGA is not higher than a specific value, the phosphazene composition can attain improved flame-retardancy and processing fluidity.

In addition, applicant respectfully submits a partial English-language translation of Reference 5 for the Examiner's reference.

Claim 2 was rejected under 35 U.S.C. § 112 for the reasons set forth on page 4 of the Office action. This rejection is moot in view of the cancellation of claim 2.

Applicant has shown that all pending claims are allowable over the cited art and hereby respectfully requests that the objection and rejections be withdrawn. Each of the presently pending claims in this application is believed to be in immediate condition for allowance and such action is earnestly solicited.

No fee is believed to be due for this Amendment. Should any fees be required, please charge such fees to Deposit Account No. 50-2215.

Respectfully submitted,

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Enclosure

(54) FLAME RETARDANT OIL
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(43) Publication Date: July 17, 1992
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(71) Applicant: BRIDGESTONE CORP
(72) Inventor: KURACHI, Ikuo et al.

[Page 3, lower right column, line 8 to page 4, upper right column, line 3, and Table 1]

<Referential Example>
(A method of preparing compounds having a chlorophosphonitrile ring)

A greatly extra amount of NH_4Cl was added to a PCl_5 solution dissolved in tetrachloroethane in accordance with Industrial Chemical Magazine 66,618 (1963) (Authors; Hajime SAITO and Narumi KAJIWARA) and the solution was heated to 130 ℃ or more. After the reaction, the reaction solution was filtered and unreacted NH_4Cl was separated from the solution. After a distillation of the filtrate, the remaining portion was treated by a petroleum ether so as to obtain a mixture of compounds having a chlorophosphonitrile ring.

<Example 1>

24g of phenol was dissolved in THF (tetrahydrofuran) and 5.8g of metal Na was added thereto to form a sodium phenoxide. A THF solution containing 10g of compounds having a chlorophosphonitrile ring obtained in the above Referential Example was dropped to this solution slowly. After the dropping, the solution was heated to the vicinity of the boiling temperature of THF and then the heated solution was fluxed for one hour. When the reaction was completed, THF was removed and the product was washed by an ether and a dilute aqueous solution of sodium

hydroxide. The washed product was subjected to an ether extraction, and the ether solution containing a mixture of compounds having a phosphonitrile ring was dried with calcium chloride. The ether was removed by drying the solution all day and night to obtain a flame retardant oil. The components of the resultant flame retardant oil were a mixture of compounds having a phosphonitrile ring as shown in the following. The flame retardant oil was present as a liquid form at room temperature and exhibited excellent electric insulating properties and high dielectric constant as shown in Table 1.

$[(C_6H_5O)_2PN]_3$	45%	$[(C_6H_5O)_2PN]_6$	1%
$[(C_6H_5O)_2PN]_4$	15%	$[(C_6H_5O)_2PN]_7$	25%
$[(C_6H_5O)_2PN]_5$	12%	Octamer and more	2%

Figure 1 represents results as to heat resistance of the oil of Example 1 and the oil of Comparative Example 2 measured by TGA (thermogravimetric analysis). In Figure 1, the horizontal axis means temperature (℃) and the longitudinal axis means weight-reducing rate, respectively. The line A means the curve of the results of Example 1 and the line B means the curve of the results of Comparative Example 2, respectively. The temperature at which the weight of the oil of Example 1 began to reduce was 175 ℃ and the temperature at which the weight of the oil of Comparative Example 2 began to reduce was 120 ℃, which demonstrated the fact that the oil of Example 1 was remarkably superior to the oil of Comparative Example 2 in heat resistance.

<Table 1> - Please see a separate paper.

[Page 4, lower left column, lines 12-18]

The compound "Phospharol NF46" * (Otsuka Chemical Co., Ltd.) $([H(CF_2CF_2)_3CH_2O]_3(CF_3CF_2CH_2O)_3)(PN)_3$ was used as a compound having a phosphonitrile ring and having only an aliphatic group as a side chain. This compound was very poor at heat resistance

as shown in Table 1 and Figure 1. (* Attorney's note: It is a phonetic translation.)

Compound having only an aliphatic group as a side chain

Mixture of trimer to heptamer having an aromatic group as a side chain

の重量減少開始温度は175℃で、比較例2のオイルの120℃に比し極めて優れた耐熱性を有することがわかった。

Example 1 ← Table 1

第1表

	実施例1	比較例1	比較例2
構造 Structure	芳香族側鎖基 3-7量体混合体	芳香族側鎖基 主成分 3量体 (95%以上)	脂肪族側鎖基
TGAにおける重量減少開始温度	175℃	180℃	120℃
室温での性状	Liquid→液体 (79cp:40℃)	Solid→固体 (m.p.106℃)	Liquid→液体 (83cp:40℃)
電気抵抗 Ωcm	1.2×10^{13}	$>10^{14}$	1.1×10^{13}
比誘電率(100Hz)	10.1	−	6.1

各特性値は以下のように測定した。

(1) 熱重量分析（TGA）：真空理工㈱製TGD-7000を使用し、Ar雰囲気下昇温速度 5℃／分

(2) 粘度：レオメトリックスファーイースト㈱製レオメトリックスダイナミックスペクトロメーターを使用

(3) 電気抵抗：㈱アドバンテスト製、絶縁抵抗計TR8601並びに液体抵抗用セルTR44を使用

(4) 誘電率：東京エレクトロン㈱製RLC DigiBridgeCR1689M を使用し、発信周波数100Hz で測定

Comparative Example 2

Thermogravimetric Analysis (TGA)

Temperature rising rate of 5°C/min. under Ar atmosphere

SINKU-RIKO, INC.

Dielectric constant (100Hz)

Electric resistance (Ω cm)

State at room Temperature

Temperature at which a weight begins to flow (Tg)